BRIEFER ARTICLES.

THE VITALITY OF SEEDS.

In the autumn of 1879 I began the following experiments, with the view of learning something more in regard to the length of time the seeds of some of our most common plants would remain dormant in the soil and yet germinate when exposed to favorable conditions. I selected fifty freshly grown seeds from each of twenty-three different kinds of plants. Twenty such lots were prepared with the view of testing them at different times in the future. Each lot or set of seeds was well mixed in moderately moist sand, just as it was taken from three feet below the surface, where the land had never been plowed. The seeds of each set were well mixed with the sand and placed in a pint bottle, the bottle being filled and left uncorked, and placed with the mouth slanting downward so that water could not accumulate about the seeds. These bottles were buried on a sandy knoll in a row running east and west, and placed fifteen paces northwest from the west end of the big stone set up by the class of 1873. A bowlder stone barely even with the surface soil was set at each end of the row of bottles, which were buried about twenty inches below the surface of the ground. I should make an exception in the case of the acorns, which were placed in the soil near the bottles, and not inside bottles. At the end of five, ten, fifteen, twenty, and now twenty-five years, sets of these seeds were tested for vitality. The names given in the following table were those in use when the seeds were buried. Some of those marked *x* germinated; none of those marked *o* germinated.

In all the species in the five tests made, eight out of twenty-two failed to germinate; and of the remaining fourteen, some of ten species germinated, often when they had been buried twenty-five years. The acorns buried near the bottles were all dead at the end of two years. I soon began other experiments with acorns, and in addition planted some black walnuts with the acorns. On a sandy knoll these nuts were buried at various depths in a hole the depth of which was equal to the length of a spade and handle, some of them three feet or more below the surface. After they had remained nearly two years, some of them were examined with the following results: Some of the walnuts and acorns planted only a few inches beneath the surface had come up the next summer after planting, while those planted at

Names of seeds tested	5th year	10th year	15th year	20th year	25th year
Amaranthus retroflexus	x	x	x	x	x
Ambrosia artemisiaefolia	o	o	o	o	o
Brassica nigra	o	x	x	x	x
Bromus secalinus	o	o	o	o	o
Capsella Bursa-pastoris	x	o	x	x	x
Erechthites hieracifolia	o	o	o	o	o
Euphorbia maculata	o	o	o	o	o
Lepidium virginicum	x	x	x	x	x
Lychnis Githago	o	o	o	o	o
Maruta Cotula	x	x	x	o	x
Malva rotundifolia	x	o	o	x	o
Oenothera biennis	x	x	x	x	x
Plantago major	o	o	x	o	o
Polygonum Hydropiper	o	x	x	x	x
Portulaca oleracea	o	x	x	x	x
Quercus rubra	o	o	o	o	o
Rumex crispus	x	?	x	x	x
Setaria glauca	x	x	x	o	x
Stellaria media	x	x	x	x	x
Thuja occidentalis	o	o	o	o	o
Trifolium repens	o	o	o	o	o
Verbascum Thapsus	x	?	x	x	o

a depth of about eight inches to two feet or a little over had all decayed. All the walnuts deeply planted had decayed, but some of the acorns planted two or three feet below the surface were still alive, or rather the young plants were alive. They had probably started soon after planting, as the cotyledons were exhausted, their nourishment having been used in developing roots and pushing up an ascending axis.

On August 12, 1889, after a part of the nuts had been planted and undisturbed for two months less than four years, I examined them. Eight acorns were found alive, with the roots about like the roots of those dug up two years before. The ascending axis in most cases was slender and crooked, with a delicate white apex. In one case there was no ascending axis, but a solid, fleshy root, apparently alive.

In all tests of the seeds buried in bottles, the results have been indefinite and far from satisfactory. I mean by this that I have never felt certain that I had induced all the sound seeds to germinate. I moisten the sand containing the seeds, and forthwith a goodly number germinate, and then they come slowly straggling along. I dry the soil and wait a few days, and after moistening, in a few days more seeds germinate. Why was I unable to induce them to start when treated to various degrees of temperature and moisture for seven months?

We see this important point. It is to the advantage of the plants not to shoot up all of their seeds at one time, but to retain a good portion alive

in the soil to be ready for stocking the earth in successive years. Again, we must consider that it makes very little difference whether all the seeds live over for a time or only a small proportion of those which were produced, as a living seed now and then left is enough to save the stock and produce new crops of seeds.

The seeds I began testing in August 1894 were kept in trial until November of that year, when the plates containing the dry sand were set away dry until the next spring, and kept in test for that year until November 1895. In this second year some seeds of eight species germinated.

In the sets of seeds which were put in condition, as I supposed, to germinate in July 1899, after being buried twenty years, some seeds of eighteen species grew during the following four months, when the plates were set away till the next April (1900), at which time the sand was occasionally wet. During this period, some seeds of mustard, mallow, shepherd's purse, and chickweed germinated.

In September 1882 I selected of the second crop of red clover five plants within a few feet of each other, which seemed much alike. The seeds of fifty good heads of each, containing 1260–1820 seeds, were shelled, and ever since, till tested, they have been kept, each lot by itself, in a two-ounce bottle well corked. For a portion of the time they were exposed to the light; for some years they have been kept in a dark closet. Nearly twelve years after collection, fifty seeds of each lot were tested for vitality, with the following results:

Of no. 1	24	germinated
Of no. 2	8	"
Of no. 3	34	"
Of no. 4	25	"
Of no. 5	0	"

Two weeks later another test of fifty seeds each was made:

Of no. 1	31	germinated
Of no. 2	10	"
Of no. 3	32	"
Of no. 4	21	"
Of no. 5	4	"

This is an average for both tests of 35.8 per cent. The difference in germination percentage of these lots of seeds perhaps may be accounted for by the presence of weevil in a few seeds; by difference in the size of seeds, or the stage of maturity; by individual peculiarities of the different plants. By some means, since testing, the bottle no. 4, containing the seeds, has been lost.

On November 16, 1904, over twenty-two years from collecting, I began tests of 100 seeds of numbers 1, 2, 3, 5, with the following results:

Of no. 1	0	germinated
Of no. 2	0	"
Of no. 3	5	"
Of no. 5	1	" possibly a second one

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SOME MEXICAN SPECIES OF CRACCA, PAROSELA, AND MEIBOMIA.

(WITH PLATE V)

THE genus name Cracca of Linnaeus (1753) has of late years been restored in place of the Tephrosia of PERSOON (1807), which is clearly a synonym, as has been well pointed out by Mr. E. G. BAKER.[1]

Dalea, although first proposed by LINNAEUS in 1737, was reduced by him in 1753 to Psoralea. It was not restored until after PATRICK BROWNE in 1756 had published his Dalea, and therefore the next available name, Parosela, must be used.

The Meibomia of ADANSON (1763) has properly been taken up in place of Desmodium (DESVAUX, 1813), which must be treated as a synonym, though there is some ground for regarding the two names as representing different genera.

An examination of these three genera by Mr. ROSE in connection with his *Studies of Mexican plants* has shown that they are greatly in need of revision, and considerable work has been done with a view to meeting this want. Mr. PAINTER has a revision of the Mexican and Central American species of Meibomia well advanced. It was not the intention to publish any notes on these genera until our revisions were completed; but there has been considerable demand, both from general collectors and from botanists who have been working on Mexican fungi, for correct names for certain species; and we have concluded to publish a few of the new combinations and new species at the present time.

Cracca talpa (S. Wats.) Rose.—*Tephrosia talpa* S. Wats. Proc. Am. Acad. **22**:405. 1887.

Cracca macrantha (Rob. & Greenm.) Rose.—*Tephrosia macrantha* Rob. & Greenm. Proc. Am. Acad. **29**:383. 1894.

Cracca Pringlei Rose, sp. nov.—Herbaceous perennial much branched at base; branches 10 to 20^{cm} long, appressed-pubescent: leaflets 7 to 10

[1] Jour. Botany, Jan. 1900.